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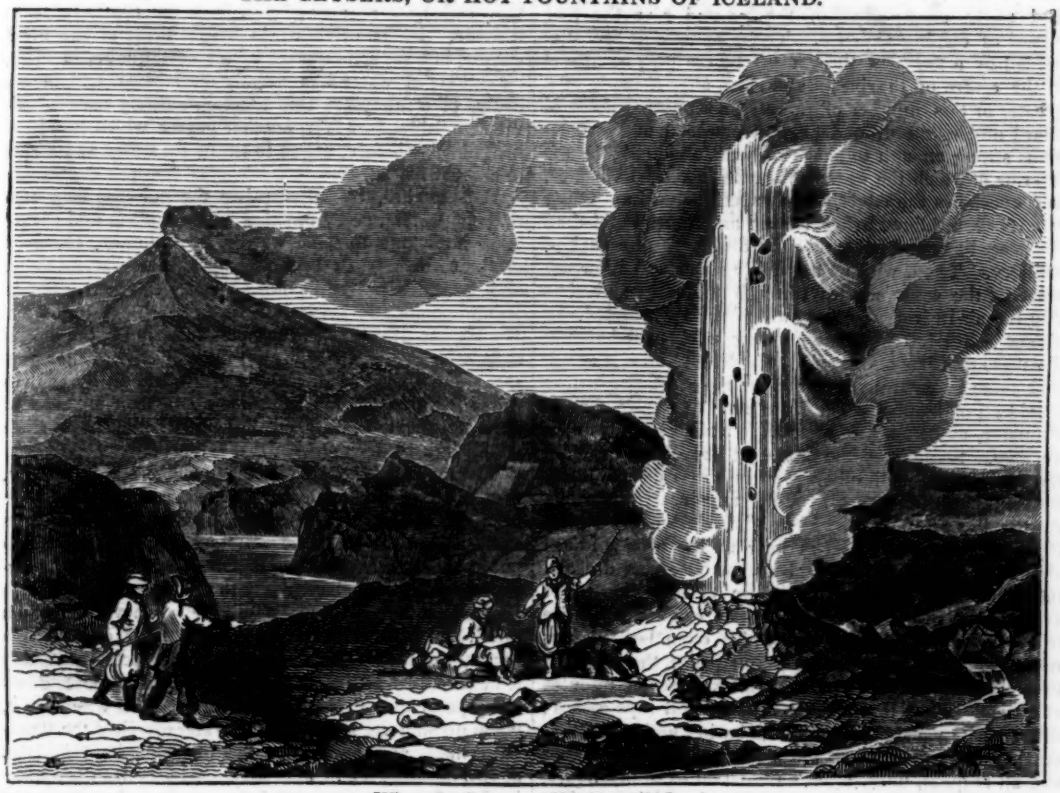
THE GEYSERS, OR HOT FOUNTAINS OF ICELAND.



[View of a Geyser, or Hot Fountain.]

IN the neighbourhood of the volcanic mountains of Iceland, the traveller frequently finds his way stopped by frightful rents in the earth, and deep fissures in the lava. He also treads on ground that sounds hollow beneath his feet; and there he sometimes hears the rushing of water in the concealed chasms over which he is walking, and at other times, where apertures occur in the thin crust of the earth, he sees steam issuing forth from the subterranean conduits and towering in the air.

The volcanic fires which pour forth such tremendous eruptions from Mount Hecla, the Yokuls, and other craters, though, generally speaking, they do not exert their more terrific energies except after intervals of years, are yet not extinct, but, burning unseen, extend far from the craters themselves, and convert the waters that flow near them into boiling fluid and highly rarefied vapour, which at certain vents maintain perennial eruptions. Instead of fire, smoke, liquid lava, lapille, and ashes, these vents or aqueous craters discharge columns of steam and spouts of boiling water; and instead of years, in most cases, only a few hours intervene between their efforts.

The most important of these issues are at Haukadal, considerably in the rear of Hecla, whose three snow-clad summits towering over a ridge of intervening hills, are, however, visible from the spot. Here, within a very limited space, are some dozens of geysers, the clouds of vapour they are constantly emitting being visible at the distance of several miles. The term geyser, which is the generic name of these hot spouting springs, is derived from the Icelandic verb "geysa,"—"to rage, to burst forth violently." The most important of the fountains at Haukadal is called the "great geyser," and as it seems to be the greatest in Iceland, we shall more particularly describe it.

Whatever may be the activity of the numerous fountains that surround it, the great geyser is always the prominent object in the extraordinary scene. It is surrounded by a large circular mound formed by the earth and matter it has ejected and deposited during the course of ages. Internally this mound is hollow, presenting a basin about one hundred and fifty feet in circumference, which is ordinarily filled to the depth of about four feet with boiling water, beautifully clear and crystalline. In the middle of this basin a pipe or funnel, about ten feet in diameter, but wider at top, descends perpendicularly in the earth to the depth of nearly eighty feet. It is this tube that is the vent of the subterranean action of fire and water. The bottom and sides of the basin within the mound are covered with whitish siliceous incrustations rendered perfectly smooth by the constant action of boiling water. Two small channels open from the sides of the basin and allow almost constant passage to some of the water. This water, still hot and strongly impregnated with mineral matter, on leaving the mound flows through a turfy kind of soil, and by acting on the peat, mosses, and grass, gradually produces some of the most beautiful specimens of petrifaction. Leaves

of the birch, and of the other stunted trees which grow in that inhospitable climate, are also found incrusted, so as to appear as of white stone, yet still preserving not merely their general form but their minutest fibres unaltered.

All the Icelandic travellers agree in representing the eruptions of the great geyser as occurring at irregular intervals. We take our account of an eruption from Dr. E. Henderson *, who visited and paid great attention to the fountain in 1814 and 1815. Low reports and slight concussions of the ground give the first signal of coming violence. These symptoms are succeeded by a few jets thrown up by the pipe or funnel in the centre of the basin, and then, after a pause of a greater or less number of minutes, a rumbling noise is heard underground, louder reports succeed, and concussions strong enough to shake the whole mound; in the interior of which the water boils with increased violence, and overflows the edges of the capacious basin. Other reports soon follow, being louder and more rapid than the preceding, and not unlike the discharge of a park of artillery. Then, with an astounding roar and immense velocity, the water rushes through the pipe, and rises into the air in irregular jets, which are surrounded and almost concealed by accompanying volumes of steam. To these first jets loftier and more defined ones succeed; and there is generally a central or main jet presenting a column of boiling water from nine to twelve feet in diameter, and from fifty to seventy feet in height, on an average. Sometimes the main jet exceeds a hundred feet in height, and other geysers are said to throw water, though not in such volume, to a greater elevation. As the jets of the great geyser issue from the central pipe, the water in the basin near to the pipe is raised about a foot and a half, and as the columns descend into the orifice whence they were ejected the water everywhere overflows. Unlike the eruptions of fire from the crater of a volcano, which often last for days without any apparent diminution or pause, these boiling fountains seldom play longer than six or seven minutes at a time. Then the action of the central pipe ceases; dense steam covers for awhile the basin; and when that moves off, nothing is seen but a sheet of clear, hot water, and all is quiet, until, after an interval of some hours, faint reports announce the approach of a fresh eruption. On Dr. Henderson's second visit to the great geyser, in August, 1815, when he pitched his tent close to it for two days, its eruptions occurred pretty regularly every six hours, and some of the columns of water rose to the height of one hundred and fifty feet.

Situated at about one hundred and fifty yards to the south of the great geyser, and scarcely inferior to it, is the new geyser, whose eruption Dr. Henderson thus describes:—

"From an orifice nine feet in diameter, a column of water, accompanied with prodigious volumes of smoke, was erupted with inconceivable force, and a tremendous roaring noise, to varied heights of from fifty to eighty feet, and threatened to darken the horizon, though brightly illumined by the morning sun. * * * * When the jets of water subsided, their place was occupied by the spray and steam, which, having free room to play, rushed with a deafening roar to a height little inferior to that of the water. On throwing the largest stones we could find into the pipe, they were instantly propelled to an amazing height, and some of them that were cast up more perpendicularly than the others remained for the space of four or five minutes within the influence of the steam. A gentle northern breeze carried part of the spray at the top of the pillar to one side, when it fell like drizzling rain, and was so cold that we could stand below it and receive it on our hands and face without the least inconvenience. While I kept my station on the same side with the sun, a most brilliant circular bow, of a large size, appeared on the opposite side of the fountain; and, on changing sides, having the fountain between me and the sun, I discovered another, if possible still more beautiful, but so small as only to encircle my head. Their hues entirely resembled those of the common rainbow."

Still nearer to the great geyser, at the distance of only eighty yards from it, there was formerly another fountain, called the roaring geyser, from the continual noise it made. Its jets rivalled in height those of the great geyser, but in consequence of an earthquake, in 1789, its volume of water was greatly diminished, and in the course of a few years this fountain entirely ceased. At the same time, however, another geyser, which had been insignificant before, began to throw up water and steam to a great height.

Earthquakes, by intercepting the subterranean currents of waters, or by opening new channels and giving other directions to those waters, by disrupting the crust of the earth here, or by filling up former crevices there, and by other processes not so easily detected, exercise an immediate and great influence over these fountains. During the dreadful earthquake that shook the island to its very centre, in 1784, not only did the greater geysers shoot up with increased violence, but no fewer than thirty-five new boiling fountains made their appearance close to them. Many of these thirty-five have since wholly subsided.

The most remarkable of the geysers still in activity, next to those already described, are the strockr, the little geyser, and the little strockr. The name of strockr is derived from the Icelandic verb "strocka,"—to agitate, to put in violent motion. Dr. Henderson informs us he discovered what he calls the key to this fountain, by which he thought he could make it play whenever he had a mind, and even double its usual height. He threw in a quantity of the largest stones he could collect—presently it began to roar—he advanced his head to look down the pipe or tunnel, but had scarcely time to withdraw it, when up shot the jets of boiling water carrying the stones with them, and attaining a height which he calculated at two hundred feet. Jets surpassed jets until the water in the subterranean cavern being spent, only columns of steam were emitted, and these continued to rise and to roar for nearly an hour. The next day he repeated the experiment with the like success; and leaving the spot to go on his journey, he says, he often looked back on the thundering column of steam, and reflected with amazement at his having given such an impulse to a body which no power on earth could control.

The little geyser is remarkable for the regularity of its discharges, playing about twelve times in twenty-four hours. Its jets, however, seldom exceed twenty feet in height.

The little strockr is still more curious, from the rapidity as well as regularity of its action, and from the eccentricity of its projection. Instead of having intervals of hours like the generality of the geysers, it plays every quarter of an hour, and instead of throwing up its waters perpendicularly, it darts them off in numerous diagonal columns. Dr. Henderson calls it "a wonderfully amusing little fountain."

Numerous other minor orifices and cavities lie round these; some of them boiling and bubbling, and being covered with the most beautiful incrustations.

From the quantity of vapour emitted from these numerous vents, it often happens that the steam unites, and forming a vast cloud, ascends, rolls, and spreads itself, till it completely covers the confined horizon and eclipses the mid-day sun. The effect produced by the reports and loud roaring of these fountains, during the stillness of night, is described as being peculiarly im-

* 'Iceland; or Journal of a Residence in that Island, during the Years 1814 and 1815,' by Dr. E. Henderson.

pressive. On the brow of the neighbouring hill, nearly two hundred feet above the level of the great geyser, there are several holes of boiling clay, some of which produce sulphur and efflorescence of alum. On the reverse of the same hill, and at its base, are more than twenty other hot springs.

Among the other boiling fountains in different parts of the island, travellers have particularly described those in a narrow valley near Reykium. There, some of the springs, which do not erupt but regularly contain water at the temperature of 200° of Fahrenheit, are used by the Icelanders for boiling, for washing their clothes, and other domestic purposes. Beyond these occur extensive banks of hot sulphur and hot clay. At the immediate edge of the valley are two large geysers frequently in eruption. They are situated at the base of a beetling mountain, whose rugged crags rise about five hundred feet above the springs. It has been calculated that, during an eruption, one of these two geysers throws up 59,064 gallons of water every minute.

Not far from this spot, numerous hot springs exist in the bed of a considerable river, and the quantity of boiling water they emit is so great that it cannot be kept under by the cold water of the river, but forcing its way upwards, it bubbles and spouts above the surface of the stream.

THE LABOURERS OF EUROPE.—No. 7.

The state of the agriculture of France, and the condition of its labourers, have not improved so much during the last forty years as one might at first have expected, from the abolition of feudal dues and of tithes, and from the general subdivision of property that has taken place. Several causes may be assigned for the still depressed state of the farmers in that country. Want of enterprise, want of capital, bad methods of cultivation which it takes several generations to correct, a deficiency of communication in many parts between one province or district and another, a heavy land-tax, restrictions on the foreign commerce of the country, and the prevalence of the métayer system, of which we have spoken in a former article *. The manner in which all these circumstances act as checks upon the agricultural prosperity of France will be exemplified in the course of the following quotations from intelligent observers who have visited that country at various times since the revolution.

We find already, in the year 3 of the Republic (1795), complaints of the state of agriculture, in a work on the 'Political and Economical State of France,' published at Strasburg, in German. The writer observes that "enlightened foreigners are astonished at the depressed condition in which they find agriculture in France; that every year an immense extent of territory is suffered to lie fallow, although good agriculturists condemn fallows. There is not in France any scientific school for the mass of the cultivators; many breeds of cattle, many seeds and plants, instruments and machinery, and above all good methods, all these still remain to be introduced from abroad: some departments, it is true, are much better cultivated than others, but the improved system which is practised in one district is unknown to the rest."

We will now see what was the state of French agriculture ten or twelve years later, when the country was thoroughly at peace internally, and order and security were maintained under the administration of Napoleon. We have an impartial witness in Colonel Pinkney, an intelligent American traveller, in the years 1807-8. He entered France by the way of Calais, and travelled on horseback and at leisure through the country, often resting at farmers' houses, and losing no opportunity of deriving information from the country people themselves. In the neighbourhood of Calais he observed that the peasantry lived comfortably; but he suspected, at the same time, that their means were partly supplied by the profits of smuggling, which was carried on very extensively on that coast. As he advanced into the country, he remarked "the slovenly management of the French farmers as compared with those of England, and even with those of America. In some of the hay-fields which I passed, at least one-fifth of the crop was scattered on the roads and in the fields. The excuse was, that the cattle would eat it, and that they might as well have it one way as another. And yet in these very fields the labour was so plentiful and minute, that the greater part of the crop was carried from the fields on the shoulders of the labourers,—men, women, and boys. In such of the fields as I saw carts, the most severe labour seemed to be allotted to the share of the women. They were the pitchers, and performed this labour with a very heavy, and, as it appeared to me, a very awkward fork. Whilst the women were performing this task, two or three fellows, raw-boned, and nearly six feet high, were either very leisurely raking, or perhaps lying at their full length under the new-made stacks."

As Mr. Pinkney approached Clermont he found the country improving in its scenery, orchards, vineyards, and corn-fields. He inquired the rent and purchase of some of the farms that were to be let or sold, and found them so cheap, that, "could he have reconciled himself to French manners, and promised himself any suitable assistance from French labourers, he would have seriously thought of making a purchase. The main point of such purchases, however, is contained in these words:—'Under proper cultivation.'"

After staying some time at Paris, where he saw Napoleon, Mr. Pinkney set off for the western provinces in company with Mr. Younge, secretary to the American Ambassador. Unlike the country between Calais and Paris, and that between Paris and Switzerland, which are mostly without enclosures except pales and ditches, the country to the westward of the capital, on the road to Chartres, is thickly enclosed with rough and open hedges, but with few gates and no stiles. Mr. Younge, who had traversed France in all directions, told Mr. Pinkney that, with the exception of the good enclosures, nothing could be so miserable as the system of agriculture along the whole road from Paris to Mans, nearly one hundred miles south-west of Paris. "The general quality of the soil is light and sandy, and exactly suited to the English system of alternate corn and roots; yet on such a soil the common course is no other than fallow, wheat, and barley, for nine years successively, after which the land is pared and burnt, and then suffered to be a fallow in weeds for another year, when the same course is recommenced. Under such management it is not surprising that the average produce of the province of Britany should not exceed twelve bushels of wheat, and eighteen of barley. Turnips they have no idea of, and as the proportion of cattle is very small, the land is necessarily still further impoverished for want of manure. The size of the farms is generally about 80 acres English; they are usually held from year to year, but there are some leases."

Under the head of Angers, Mr. Pinkney observes that there is scarcely a good house inhabited within the walls. The provincial towns in France differ in this respect from those in England, in which you generally find a number of good houses, where retired merchants and tradesmen live in the ease and style of private gentlemen. There is little or nothing of this kind in a French country town. Every house is a shop, a warehouse, or a lodging-house. "In England, and even in America, there are few tradesmen long resident in a town without having obtained a sufficiency to retire; whilst the French towns being comparatively poor, and their trade insignificant, the French

* See 'Labourers of Europe, No. 6,' in No. 81 of the 'Penny Magazine,' July 6, 1833.

tradesman can seldom do more than obtain a scanty subsistence by his business. In all the best French towns the tradesmen have more the air of chandlers than of great dealers. In some of their principal manufacturing places there may be indeed a few principal men and respectable houses, but neither these men nor their houses are of such number and quality as to give any dignity or beauty to their towns beyond mere places of trade. The French accordingly, judging from what they see at home, have a very contemptible idea of the word merchant; and if a foreign traveller of this class should wish to be admitted into good company, let him pass by any other name than that of a *marchand* or *négociant*. This class of foreigners are specifically excluded from admission at court." This was in the time of Napoleon. We must add that the French word *marchand* does not correspond to the English "merchant," but means a retailer, a shopkeeper; whilst the word *négociant* means a wholesale dealer, a man who has a counting-house, who negotiates bills of exchange, &c. The above remarks of Mr. Pinkney hold good in most parts of the continent besides France, and especially in Italy and Spain.

The banks of the Loire from Angers to Tours and Blois, and higher up the river to Orléans and Nevers, and thence to Moulins, constitute the finest and most fertile part of France. The condition of the peasantry is comfortable; they are temperate, good-humoured, and sufficiently clad; their wants are few; and their labour, added to the fertility of the soil, is sufficient to satisfy them. They repine not for luxuries of which they have no notion. The women, however, have more than their due share of the labour,—they reap, bind, and load. They soon lose therefore every appearance of youth in the face; they look old and wrinkled; and the old peasant women in France are absolutely frightful.

There are no parochial taxes in France for the relief of the poor as in England, but distress seldom occurs without being relieved. An inhabitant of the northern countries and cold climates can scarcely form an idea what a very different kind of sustenance is required in southern ones. Chestnuts, grapes, and onions are, to the French peasant, what potatoes are to the Irish. "The breakfast of a French labourer usually consists of bread and fruit; his dinner of bread and an onion; his supper of bread, milk, and chestnuts. Sometimes a pound of meat will be boiled with the onion, and a *bouilli* is thus made, which, with management, will go through the week. The climate is such as to require no expense in fuel and very little in clothes."—*Pinkney*, p. 299.

There are no game-laws in France, but there is a decency and moderation in the peasants which answers the same purpose. No one attempts to shoot game except on land of which he is the proprietor or tenant.

The farms in the central provinces of France are very small, and the farmers are consequently poor. They have neither the spirit nor the means of improvement. They are, in fact, but a richer kind of peasantry. There are few or no leases in these provinces, and this is one of the reasons why agriculture has remained where it now is for these four or five last centuries. In large estates, one-fourth is generally forest and another fourth waste. In England, the forest and waste would be brought into cultivation; but in France, the forest is little better than a waste, and the waste is turned to as little purpose as if it were the wild sea-beach.

MINERAL KINGDOM.—SECTION 18.

COAL.

Coal-Fields.—Having presented our readers with a sketch of the natural history of coal, including its composition, geological situation, and probable origin, we shall now proceed to describe its geographical position in the United Kingdom. We shall begin with England, giving a general view of all the coal-fields; and we shall then enter into a somewhat more detailed description of some of the most important of these.

Previously to the researches of the English geologists, within the last fifteen years, very vague notions prevailed as to the extent to which this valuable mineral was spread over England; and it was a belief by no means uncommon among persons unacquainted with such subjects, that there was no part of the country in which it might not be found. Endless were the trials, and countless the sums of money wasted in borings and sinkings of shafts, where there was as little chance of finding a workable coal as gold or diamonds. But since the publication of the geological maps of Mr. Greenough and Mr. Smith, every one who chooses to inquire may know where our present coal-fields are situated, where there is a possibility that others may exist, and, what is of no less importance, where the mineral structure of the ground is of such a nature as to make it certain that searches after coal in such situations can only end in disappointment and loss. It is hardly necessary to add, that it is a vulgar error to suppose that coals grow, and that they will be replaced in the situations from which they have been once extracted. The annexed outline map gives a general view of all the coal-fields of England: and it will be seen that fully one half of the country is destitute of coal; for all that lies east and south of the double line, Z Z, from the mouth of the Tees in Yorkshire, to Lyme Regis in Dorsetshire, is composed of the superior secondary strata; and although some of these do sometimes contain thin beds of coal of a particular kind, it may be confidently said, that the kind of coal which we usually consume will never be found in those upper secondary strata; and, unless under very favourable circumstances, the inferior kind above alluded to can never be worked with profit. It will also be seen how comparatively small a space the coal measures occupy. It is necessary to remind our readers, that the spaces here marked with dark lines are the *geological* boundaries of the coal formations, which, as we have already explained in previous sections, consist of many different kinds of stone besides coal; and that it must not be supposed that workable coal is spread over the whole space marked by the darker shade. Not only is that far from being the case, but there is a very large part of all those spaces where not a trace of coal is to be seen, there being only sandstones, limestones, or shales, the other members of the coal formations.

Besides showing the positions of the different coal deposits, the map exhibits the boundaries of the country which each supplies with fuel. We are indebted for this information to the evidence given by Frederick Page, Esq., before the Committee of the House of Commons on the Coal Trade in 1830. Mr. Page stated, that in the course of several years' travelling over England, he had collected so much information as to the distribution of coals by the different inland navigations, as to be able to construct a map on which the boundaries were laid down: he gave a copy of that map to the Committee, who published it along with their Report. In the annexed map, it is to be understood that all the space included within the line which surrounds a coal deposit, is supplied from that source. the larger districts are further distinguished by a small letter corresponding with the capital letter which marks the coal-field. These boundaries are of course not rigorously correct, but they are sufficiently so to give a tolerably accurate general view how far the market of each coal-field extends, independent of foreign export, and the supplies to Scotland from the Northumberland district, and to Ireland from the western coal-fields. The extent which the consumption of a coal-field reaches, depends upon a variety of circumstances, such as the

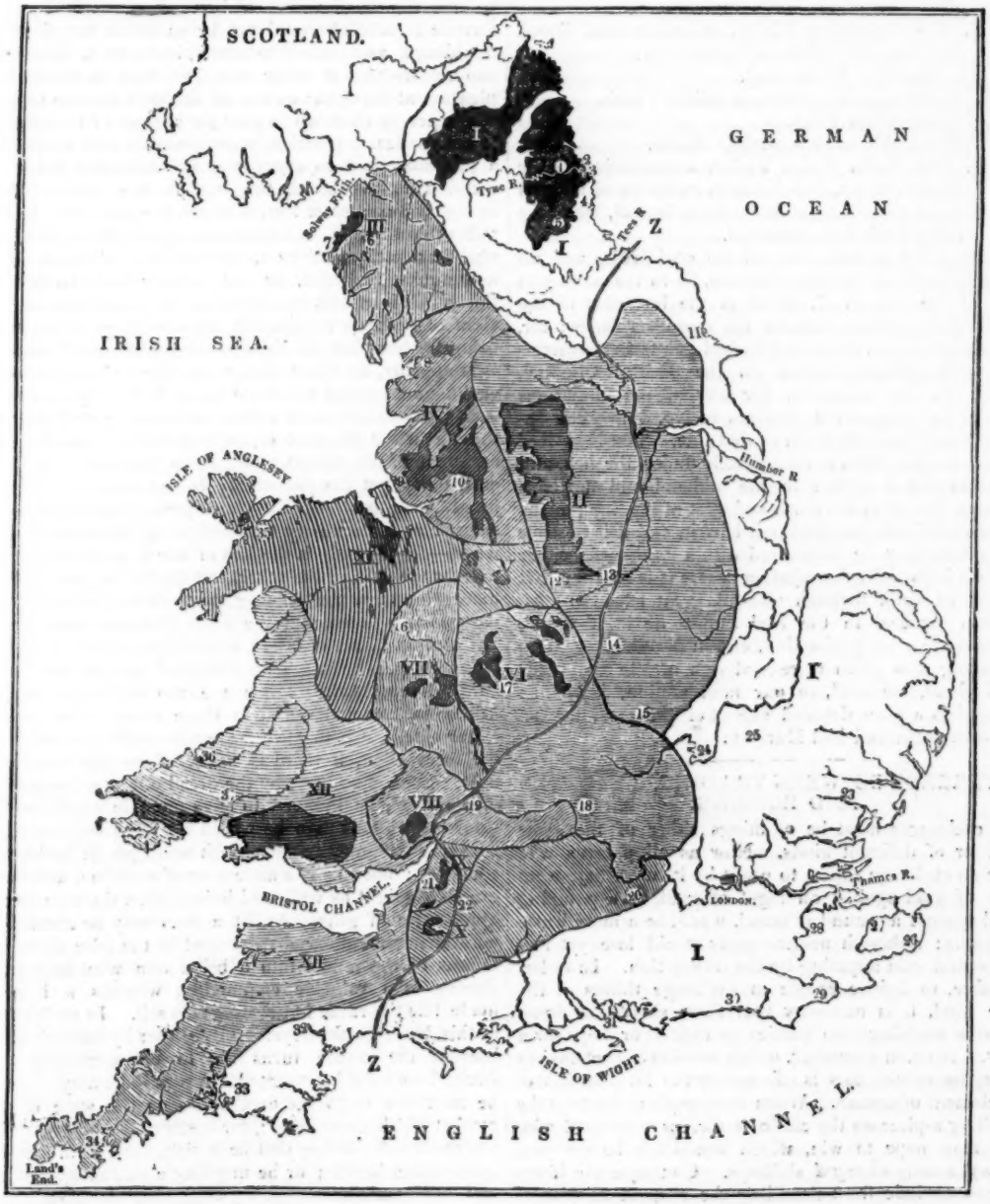
facility of transport by sea or by canals, the quality of the coal, and its price at the pit's mouth; this last must be in a great degree regulated by the expense of bringing it to the surface, which is very variable, according to situations.

There are in England and Wales twelve great coal-fields, of which those marked I. II. IV. VI. XII. are the most important. These are,

I. The Northumberland and Durham Fields, the almost exclusive feeders of London, and supplying, besides, the whole of the eastern and southern coasts from Berwick to Plymouth, and as far inland as the county of Bedford. Formerly the inland markets extended further; but the extension of canals has brought other and cheaper coals into competition. There is also a very large foreign export, and a considerable quantity is sent to Scotland.

II. The Yorkshire, Nottinghamshire, and Derbyshire Fields.

A Map showing the Geological Position and Commercial Distribution of the Coal of England and Wales.



1 Newcastle.	7 Whitehaven.	13 Nottingham.	18 Oxford.	23 Colchester.	28 Maidstone.	33 Plymouth.
2 North Shields.	8 Lancaster.	14 Leicester.	19 Gloucester	24 Bedford.	29 Hastings.	34 Falmouth.
3 South Shields.	9 Liverpool.	15 Northampton.	20 Windsor	25 Cambridge.	30 Brighton.	35 Caernarvon.
4 Sunderland.	10 Manchester.	16 Shrewsbury.	21 Bristol.	26 Dover.	31 Portsmouth.	36 Cardigan.
5 Durham.	11 Scarborough.	17 Birmingham.	22 Bath.	27 Canterbury.	32 Exeter.	37 Caermarthen.
6 Cockermouth.	12 Derby.					

The dark shade of tint shows the extent of the Coal Fields.

The lighter shade represents the districts of the country supplied by them.

The lines which express the tints are in both cases parallel to each other, and in each of the twelve districts have a different direction, except the Newcastle and Durham, in which, for the sake of clearness, the coal fields (I.) have been left black, and the places supplied by them white. Each district is surrounded by a strong black outline.

III. The Whitehaven Fields.
IV. The South Lancashire Fields.
This, with the Yorkshire and Nottinghamshire Fields, are the foundation of our great national superiority in the woollen and cotton manufactures, the principal seats of which are upon them.
V. The North Staffordshire, or Pottery Fields.
VI. The South Staffordshire, or Dudley and Warwickshire Fields,—not of great superficial extent, but immensely productive, and containing the thickest seam of coal in the island. It is also one great seat of our iron manufactures
VII. The Shropshire Fields, including Coal Brook Dale, and the Plain of Shrewsbury.
VIII. Forest of Dean Field.
IX. South Gloucestershire, or Bristol Fields.
X. Somersetshire Field.
XI. North Wales, or Flintshire Fields.
XII. The South Wales Fields, comparatively little worked as yet, but the most extensive of all, and upon which our posterity must depend, when the other fields are exhausted.

Thus it will be seen that all the coal-fields, and all the great seats of our manufactures, lie to the north and west of the line Z Z, which is the boundary of the middle and superior strata of the secondary series; for, with the exception of some detached points in Somersetshire and Glamorganshire on the Bristol Channel, neither the lias limestone, nor any of the formations superior to it (I. in the diagram in No. 51.—19th January,) are found westward of that line. The New Red Sandstone, K, which is immediately under the lias, and covers so vast a surface in the midland and northern counties, lies all to the north and west of the line; many of the coal-fields are surrounded by it, and it is possible that others may be discovered within its domain, either where it is partially denuded, or where it is so thin that it may be sunk through without great expense. All searches for coal in the Red Sandstone itself would, according to every probability, end in disappointment.

Having now given a general view of the coal-fields of England, we shall, in our next section, lay before our readers a more detailed sketch of the great deposit of Northumberland and Durham.

DIFFERENCE BETWEEN TRADING, GAMBLING, AND ROBBING.

ALL exchanges must be of things either of the same kind, or of different kinds. Now as all persons who make an exchange expect to profit by it, to exchange an ingot of gold against an ingot of gold, or a pound of bread against a pound of bread, would be a mere waste of trouble; although neither party would lose, yet neither would gain anything by the transaction. In order, therefore, to induce people to exchange things of the same kind, it is necessary that there should be some means of enabling both parties to expect or hope for a profit. Now, in gambling, which consists in exchanging money for money, this is effected by the introduction of the element of chance. When two people agree to stake a shilling a-piece on the cast of a die, as one *must* win, *both* may hope to win, which would not be the case if they merely *changed* shillings. Consequently if we were to exclude from gambling the element of chance, which can only be done by multiplying the stakes, it would be reduced to a mere waste of labour, attended with neither pecuniary loss nor gain. A man who passed twelve hours a day for fifty years in tossing up for sovereigns would probably be able to rise many hundred times during that period neither a gainer nor a loser. And for this reason, in all lotteries and gaming establishments there is a small advantage allowed to the undertaker of the table, which, in the long run, reduces the gain to a certainty; whereas, if there was no such advantage, and if there was no fraud practised on the players, a lottery or a gambling bank could never yield any profit, as its transactions would consist in merely exchanging money for money. When, however, gambling is not practised on a sufficiently large scale to reduce its operations to a certainty, and consequently to exclude the possibility either of loss or gain, (which must be the case with all unprofessional gamblers,) it is not merely a waste of time, but is always a losing speculation; because, although the chance of gain is equal to the chance of loss, yet the advantage of gain does not counterbalance the disadvantage of loss. A man whose entire fortune is £1000 would not be so much benefited by doubling it, as he would be injured by losing it. He would suffer more pain at being penniless than he would feel pleasure at being the owner of £2000: for this reason, if ten people sit down to play for a sum of importance to the parties, it is strictly true, though it may sound like a paradox, that as every man in succession takes the dice-box in his hand, the chances are against him: he stakes a chance of loss, of which the pain may, for the sake of illustration, be valued in numbers at one hundred against a chance of gain, the pleasure of which may, numerically reckoned, be not greater than twenty or thirty. It is on this principle that the expediency of the right of property is founded, the advantage of the thief being far less than the disadvantage of the legal owner.

It appears, therefore, that in order to induce people to exchange things of the same kind, it is necessary that each party should have a prospect of gain; and that although such a prospect exists in gambling, which is an exchange of this nature, and there is a chance of gain to each party, yet the probability is that each will be injured by the transaction. Consequently gambling, considered as a pecuniary transaction, is injurious in two ways,—for not only is the loss of one a necessary condition for the gain of the other, but the losing party suffers more pain than the gaining party feels pleasure; one party always loses, and the other does not gain to the full amount of his loss. In exchanges of things of different kinds, all this (as we remarked in a former Number*) is reversed. These are the exchanges which belong to commerce, and in these there is no loss on either side, but both parties are necessarily benefited by the transaction, if there is neither force nor fraud nor mistake. A man may, by the dread of the consequences of a refusal, be induced to give more in exchange for services or goods than he would do if he was free from fear, as sometimes happens with travellers in barbarous countries; but this is a mere case of extortion, and such exactions might as well, and indeed often do, assume the appearance of gifts. Again, a man may be cheated in an exchange, and may be deceived by the false representations of the vendor into a belief that what he is purchasing is a valuable commodity, whereas it is only made, like the razor in the story—to sell. In such cases as this, however, the buyer is only a loser by the exchange, because the article turns out to be something different from what he expected. A purchaser may likewise be mistaken as to his own wants, or the state of the market which he supplies: for instance, he may send for a physician, believing that he is sick, though, in fact, he is in perfect health; or he may buy a pair of spectacles, and the next day completely regain or completely lose his eyesight; he may buy gunpowder and muskets in expectation of a war, and no war may break out; or corn in expectation of a bad harvest, and an abundant one may follow; or send a cargo of skates to a country where water never freezes. There are certainly many cases in which a man, acting on false or imperfect information, or from a wrong judgment, finds to his cost that he has made a losing bargain: but property may

* See Penny Magazine, No. 36, vol. i. p. 293.

equally be depreciated which has not been the subject of barter; nor does a speculator lose because he has made a certain exchange, but because he possesses certain commodities. The farmer loses with the corn-merchant by a fall in the prices of grain, and an inn-keeper on a road on which the travelling is suddenly stopped by a war is equally injured whether he has acquired his property by inheritance or by purchase.

With the exception, therefore, of the three cases just mentioned, viz., extortion, fraud, and mistake, all exchanges of things not of the same kind are necessarily advantageous to both parties. The profit of the one party is quite independent of the profit of the other; nor do their gains stand to each other in any fixed ratio. They may both be large or both be small, or one large and the other small. Thus Herodotus mentions some Greek merchants who made an immense profit by trading with the barbarous inhabitants of Iberia, or Spain, and giving them goods in exchange for silver. However profitable this adventure may have been to the Greeks, probably the Iberians were equally well satisfied with their bargain, as they doubtless prized far more highly than their precious metal the manufactured articles which they got in exchange for it. The gain of one party affords no means of ascertaining the gain of the other: the profits of an exchange are not like the buckets of a well, in which one rises in precisely the same measure as the other falls, but they depend on the difference between the value of the goods sold and the goods bought, in the market from which the former are taken, and to which the latter are carried.

If this plain truth had been sufficiently understood, all the national jealousies with regard to trade, which have been the cause of so many wars, so many commercial restrictions, and so much suffering to mankind, might have been avoided. All these jealousies have been founded on the notion that in trade one man's gain is another's loss, and consequently that one nation's gain is another's loss. It was with this false impression, strengthened indeed by national hatred and the desire of weakening his enemies, that Bonaparte, in the preface to his Berlin Decree, represents England as raising her commerce and industry on the ruins of the industry of the Continent. So far is it from being true that the industry of one country is not compatible with the industry of another, that foreign productions are absolutely indispensable to the existence of commerce. If England had in truth succeeded in destroying the industry of the Continent, she would, at the same time, without the assistance of the Berlin Decree, have destroyed her commerce with the Continent; for nobody will sell goods to those who have nothing to give in exchange for them. It was under the influence of the same false opinions that Bonaparte (according to his own account) refused, after the peace of Amiens, to renew the commercial treaty between France and England, except on terms of reciprocity, viz., that if France received so many millions of English imports, England should be obliged to take in return the same quantity of French productions. (Sir Walter Scott's 'Life of Napoleon,' ch. 99.) Supposing that so absurd a treaty had been concluded between England and France, it would probably have been easy to evade its stipulations by false valuations, and other contrivances which nullify impolitic and oppressive laws; but the reciprocity which Bonaparte wished to enforce by treaty necessarily exists without a treaty. It would have been impossible for England to have sold to France goods to the value of a million, without receiving in payment from France, either directly or circuitously, other goods to the value of a million.

All regulations of this kind intended to ensure an equality or a community of advantage in commercial dealings, have been founded on the belief that loss or gain imply one another. This opinion, manifestly false as it now appears to us, was no long time ago received as an undeniable axiom among persons who had not devoted a particular attention to the subject of trade. "As to mere wealth, that is to say money, (said Dr. Johnson, speaking of Smith's 'Wealth of Nations,') it is clear that one nation or one individual cannot increase its store but by making another poorer." (Boswell's 'Life of Johnson,' vol. iii., p. 148.) Misled by a false analogy, they conceived, that because in gambling, thieving, and war, one person can only gain at another's expense, therefore this is also the case in trade.

In war, indeed, it is emphatically true that one man's gain is another's loss; nor does conquest simply take the property from the owner, but what it does not waste, it places in the spoiler's hands with a value immensely depreciated. "At the first view it should seem that the wealth of Constantinople (says Gibbon, speaking of the first capture of that great city) was only transferred from one nation to another, and that the loss and sorrow of the Greeks are exactly balanced by the joy and advantage of the Latins. But in the miserable account of war, the gain is never equivalent to the loss, the pleasure to the pain*." Nor does it often happen that the spoils of the victor are sufficient to repay the cost of victory; and the lot of mankind would have been far happier if all governments had felt the truth of the remark which Sir Walter Scott, in one of his novels, puts in the mouth of the regent Murray, that "war is the only game from which both parties rise losers."

But in trade, so far from one party always losing, and the other party never gaining to the extent of the other's loss, both parties always gain, and the profit of the one does not diminish the profit of the other. While in all plunder and rapine, whether between nations or individuals, the benefit is necessarily partial, and can only be purchased by a disproportionate expenditure of suffering and misery: the benefits of commerce are general, require no corresponding sacrifice, and are free from any alloy of evil.

SAINT PETER'S.—No. 3.—(*Concluded.*)

The Basilica, or cathedral of St. Peter's, does not stand within the limits of the ancient city of Rome, nor is it indeed on the same side of the Tiber as the most renowned parts of that city. It rises on the side of the Vatican Hill, which may be considered as an extension of the Janiculum, the only one of the seven hills on the right or north bank of the river, the other six being all on the left bank.

"In the most high and palmy state of Rome," it was on the Vatican that the triumphs of conquerors were prepared, and the processions marshalled; at a later period, under the empire, the hill was adorned with temples, palaces, and places of public amusement; and here stood the circus of Caligula or of Nero, in which many of the early Christians are said to have been killed in those barbarous combats and games which disgrace the Roman name. This circus was also said to be the scene of the crucifixion of the apostle Peter. It was Constantine the Great who first erected a Christian church on the blood-defiled spot, choosing for its site part of the ground that had been occupied by the circus, and the spaces where the temples of Mars and Apollo had stood. As architecture was then in a very degraded state, it may be concluded that the edifice of Constantine could boast no great beauty; its magnitude, however, was considerable, being three hundred feet long, and more than one hundred and fifty feet wide. After standing for nearly twelve centuries, it threatened ruin, and several popes endeavoured to avert this by

* 'Decline and Fall of the Roman Empire,' vol. vii., p. 497.

repairs and additions; but at length Julius II., a pontiff of great energy, determined, in 1503, to erect an entirely new temple, which should stand over and include the site of the most important part of the old one.

Bramante Lazzari was the architect he preferred, and whose plan was, to build the church in the form of a Greek cross. Shortly after Bramante's death the work fell to the great Michael Angelo Buonarotti, who gave the edifice the peculiarly sublime character it possesses, still following up the plan of Bramante inasmuch as related to the form of the Greek cross. "There are eighteen whole years of Michael Angelo's life in the church of St. Peter's," says Dupaty; but the great artist could not live to complete so vast a work, and the mantle of his genius fell on none of his successors. The original plan, moreover, was departed from,—the lengthy, unequal Latin cross was substituted for the Greek, because it was considered essential *that the new edifice should include the whole of the site of the ancient church of Constantine!* To this last circumstance are mainly attributable the defects in the building.

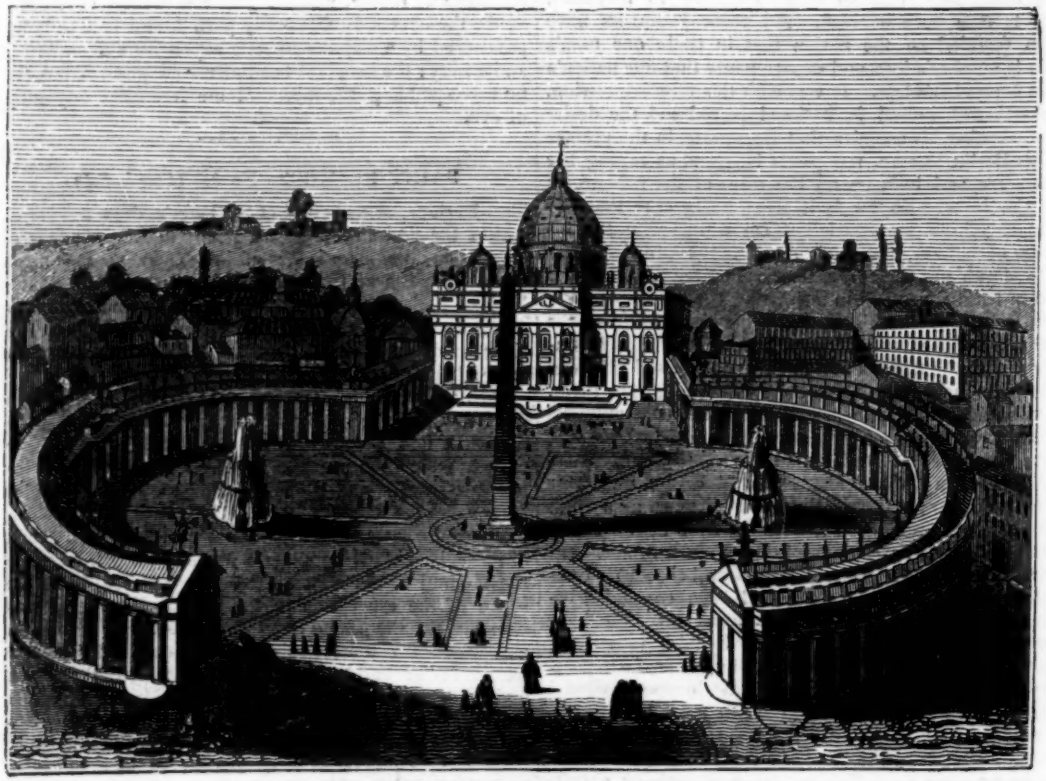
The first stone of the church was laid by Pope Julius II., in 1506, and the front was completed in 1622, during the pontificate of Paul V., the seventeenth successor of Julius. Although constantly advancing, with all the means that the wealth and extensive influence of the Roman hierarchy could then command, it took the reign of eighteen popes and the period of one hundred and fifteen years to see the temple *alone* finished. The splendid additions and accessaries occupied one hundred and fifty years more. Up to the year 1622 the buildings cost the Roman see forty millions of crowns (more than eight millions sterling); and between that date and 1784 nearly ten millions of crowns more were expended. At the present time it costs the papal treasury thirty thousand crowns annually to keep the immense edifice in repair.

As scarcely two books of travels agree in their accounts of the dimensions of St. Peter's, we are happy to be able to give the correct measurements, as recently made by an English architect.

The clear *inside* length of the church is six hundred and fifteen feet, and the breadth, in the transepts, four hundred and forty-eight feet. The extreme height, from the level of the piazza before the temple to the apex of the cross, is about four hundred and sixty-four feet, or nearly one-fourth as high again as our St. Paul's. The distance from the extreme line of the ellipsis of the colonnades to the portals of the church is nine hundred feet, which, added to the *outside* length of the church, including its thick walls and vestibules, gives the prodigious distance of nearly one-third of a mile, covered by St. Peter's and its accessaries.

The masonry of the church, its cupola, (which is externally covered with lead,) and its adjuncts, is of Travertine stone. Whole quarries must have been exhausted in the superstructure, or parts that meet the eye, yet a still vaster quantity of stone remains unseen, the depth of the foundations and the enormous thickness of the substructions being such that there is actually more of the material below than above the surface of the ground.

It must be remarked, that the general view which we now present to our readers has been composed from an imaginary point considerably above the tops of the houses opposite to St. Peter's; it is, in short, a bird's-eye view, intended to show, more clearly than any really practical view could, the arrangement of the various parts and objects composing the whole.



[Bird's-Eye View of St. Peter's.]

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